

**What is claimed is:**

**[Claim 1]** A method for preparing an area for fabrication of a metal gate electrode with multiple work functions, the method comprising the steps of: depositing a material having a first work function; forming a conductive hard mask including one of a metal containing conductor and a metal silicide over the material; using a photoresist mask to remove the conductive hard mask from an area for a device having a second, different work function selective to the material; and removing the photoresist mask, leaving the conductive hard mask for use in removing the material from the area and inclusion in the metal gate electrode.

**[Claim 2]** The method of claim 1, wherein the metal silicide includes one of tungsten silicide (WSi), titanium silicide (TiSi<sub>x</sub>), tantalum silicide (TaSi<sub>x</sub>), nickel silicide (NiSi), cobalt silicide (CoSi<sub>x</sub>), and the metal containing conductor includes one of tantalum nitride (TaN) and tantalum silicon nitride (TaSiN).

**[Claim 3]** The method of claim 1, wherein the conductive hard mask has a thickness of no less than 10 Å and no greater than 500 Å.

**[Claim 4]** The method of claim 3, wherein the conductive hard mask has a thickness of no less than 20 Å and no greater than 250 Å.

**[Claim 5]** The method of claim 1, wherein the photoresist removing step includes conducting a wet etch using a chemistry including at least one of sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) and peroxide (H<sub>2</sub>O<sub>2</sub>).

**[Claim 6]** A method of forming a gate electrode, the method comprising the steps of: forming a gate dielectric; depositing a first metallic conductor having a first work function;

depositing a conductive hard mask on the first metallic conductor including one of a conductor and a metal silicide;  
removing the conductive hard mask from an area for a particular device type using a photoresist mask selective to the first metallic conductor;  
removing the photoresist mask;  
removing the first metallic conductor in the area with the conductive hard mask protecting the first metallic conductor;  
depositing a conductor; and  
forming the gate electrode.

**[Claim 7]** The method of claim 6, wherein the conductor depositing step includes depositing a second metallic conductor having a different, second work function, and depositing a silicon-containing conductor.

**[Claim 8]** The method of claim 6, wherein the conductor depositing step includes depositing a silicon-containing conductor.

**[Claim 9]** The method of claim 8, wherein the first metallic conductor includes a p-type metal, and the silicon-containing conductor is highly doped n-type.

**[Claim 10]** The method of claim 6, wherein the metal silicide includes one of tungsten silicide (WSi), titanium silicide (TiSi<sub>x</sub>), tantalum silicide (TaSi<sub>x</sub>), nickel silicide (NiSi), cobalt silicide (CoSix), and the metal containing conductor includes one of tantalum nitride (TaN), tantalum silicon nitride (TaSiN).

**[Claim 11]** The method of claim 6, wherein the conductive hard mask has a thickness of no less than 10 Å and no greater than 500 Å.

**[Claim 12]** The method of claim 11, wherein the conductive hard mask has a thickness of no less than 20 Å and no greater than 250 Å.

**[Claim 13]** The method of claim 6, wherein the conductive hard mask removing step includes conducting one of a wet etch and a reactive ion etch.

**[Claim 14]** The method of claim 6, wherein the photoresist mask removing step includes conducting

a wet etch using a chemistry including at least one of sulfuric acid ( $H_2SO_4$ ) and peroxide ( $H_2O_2$ ).

**[Claim 15]** The method of claim 14, wherein the first metallic conductor removing step includes using the wet etch.

**[Claim 16]** A method of forming a metal gate electrode with multiple work function, the method comprising the steps of:

depositing a dielectric on a substrate;

depositing a first metallic conductor having a first work function over the dielectric;

depositing a conductive hard mask on the first metallic conductor including one of a conductor and a metal silicide;

removing the conductive hard mask from an area for a particular device type using a photoresist mask;

removing the photoresist mask to a remaining portion of the conductive hard mask;

removing the first metallic conductor in the area using the conductive hard mask to protect the first metallic conductor;

depositing a second metal having a second, different work function in the area;

depositing a silicon-containing conductor over the first and second metals; and

forming the metal gate electrode.

**[Claim 17]** The method of claim 16, wherein the metal silicide includes one of tungsten silicide (WSi), titanium silicide (TiSi<sub>x</sub>), tantalum silicide (TaSi<sub>x</sub>), nickel silicide (NiSi), cobalt silicide (CoSi<sub>x</sub>), and the metal containing conductor includes one of tantalum nitride (TaN), tantalum silicon nitride (TaSiN).

**[Claim 18]** The method of claim 16, wherein the conductive hard mask has a thickness of no less than 10 Å and no greater than 500 Å.

**[Claim 19]** The method of claim 18, wherein the conductive hard mask has a thickness of no less than 20 Å and no greater than 250 Å.

**[Claim 20]** The method of claim 16, wherein the conductive hard mask removing step includes conducting one of a wet etch and a reactive ion etch.